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ABSTRACT

Cost-income studies are designed to serve two functions in instructional program evaluation. First, they act as the indicator of the economic value of a program. This economic value in conjunction with the other educational values needed in program evaluation allow for the most realistic appraisal of program worth. Second, if the studies show a program to be loss-producing, the constraints used in the study and the elements of the study itself often indicate prescriptive measures for program health. This document examines some of the methods and problems of conducting cost-income studies. Before a cost-income study begins, there should be an agreement with users as to the time frame of the study, the definitions of the elements of the study, and the general methodology. Income elements should include student income, a state support, and any other definable income. Expenses should include direct costs, department and college-wide overhead, cost of equipment, and depreciation. All cost data included in income and expense items should use only the monies of the general current funds of the college, and not federal or nonrecurring funds. Appendix A of this document gives an example of a cost study of a hypothetical program. Appendices B and C provide examples of cost-income formulas. (NHM)

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THE COST-INCOME COMPONENT

OF PROGRAM EVALUATION

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A very wise lady from the hill country of southern Indiana has developed a philosophy over the many years of her life that allows her to live happily with her meager lot. As she will tell the restless young who will pause to listen; "Tell me what thee wants, and I will tell thee how to live without it."

The Florida Legislature has been using this philosophy with Florida public post-secondary education for several years. Some programs which post-secondary education wants may be those things we will have to learn to live without. Painful evaluations are necessary to learn what programs and how much.

Although program evaluation is a theoretical component of every educational planning and budgeting cycle, it is not necessarily a realistic or meaningful endeavor during times of reasonable funding. Program decisions too often appear to be made on a changing set of values with little, if any, cost and/or income information.

The value component is, of course, the major component in any program decision. However, values have often been ill-defined. Vague terms such as, "community commitment", "educationally sound," "meets state or national needs", "adds prestige", and "supports other programs" have become values on which programs have been justified. Documentation of values such as those just listed has not always been produced or if it has, the documentation has been as vague as the terminology. Under the present stress of budget restrictions, values need to be defined in more precise terms. Program retention or expansion now very often encroaches upon other programs of the institution in a very real and restrictive manner. Values must be examined not only in the program under consideration but also in any other program affected. Thus, value definition will have to be precisely stated in order to allow for the necessary give and take.

The second component of program evaluation is an examination of the cost to income relationship of the program. This cost to income relationship becomes a value to add to the mix. New questions arise. Is the value gained worth any losses incurred? To what extent can other programs be expected to support a loss producing program? Which programs are to be combined to produce

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a self supporting unit within the total framework of the college or university? Answers to these and similar questions form a very real part of any program evaluation and of necessity are unique to each institution. This paper will leave these answers to the more daring souls at each institution. The purpose here is to examine some of the methods and problems of conducting cost-income studies.

Cost-income studies as developed by the Management Systems Office of Seminole Community College vary greatly in the amount of detail and depth but are precisely defined. The attention to definition allows the user the options of introducing new elements, changing the elements, adjusting the mix of elements, or requesting greater detail. The studies are not purported to be precise measurements of anything. Rather, they are produced to illustrate, within the carefully defined constraints, the economic health of a program.

Hopefully, the studies serve two functions. First, the studies can act as the indicator of the economic value of a program. This economic value used in conjunction with the other values needed in program evaluation allow for the most realistic appraisal of the present worth of the program. Second, if the studies show the program to be a marginal program or a loss producing program, the constraints used in the study and the elements of the study itself often indicate prescriptive measures for program health. Again, there must be a critical examination of the interaction of economic and educational values. Are the changes required to produce economic health too drastic to allow the program to operate in a meaningful manner? Can two programs be combined in such a way to improve the economic health of both without too great an educational loss in the trade off? What elements in the cost-income mix are amenable to adjustment? How much adjustment is required? What elements not in the study need to be investigated? In the process of this examination, programs can and have changed their character to such a degree that the financial picture is brought into a positive focus.

Before actual cost-income studies begin, there should be an agreement with users as to the time frame of the study, the definitions of the elements of the study, and the general method used in the study. Hopefully, this agreement will lessen, to some degree, the often violent reaction which follows the publication of some studies. At the very least the agreement will provide a plausible beginning for the ensuing discussions.

The time frame is important because data need to be as current as possible. However, the data need to be as accurate as possible. At Seminole most cost-income studies are called for during Term II. This is the time of very difficult personnel and budget decisions. The studies most generally encompass Term I data only. Personnel, payroll, financial and student data are complete and checked to provide a sound base. The use of Term I data can create some problems. The extension of the information to a yearly basis is fraught with hazards and often requires a tentative follow-up of Term II data. Also, Term I is often a high enrollment, high productivity term and can paint a rosey picture which full year operations will not support. However, the use of prior year data or the estimation of full year operations pose too many uncertainties. The limitations imposed by using Term I data do not negate the usefulness of the studies if the users are well aware of the constraints and problems.

Income elements include student income, state support, and any other definable income such as direct support from industry, government or other sources. Student income, unfortunately, is not clearly defined in a multipurpose institution such as Seminole. Credit fees are twelve dollars per student credit hour. Non-credit courses vary from less than a dollar per student semester hour equivalent to well over twelve dollars per student semester hour equivalent. Term I 1975-76 data shows the Seminole Community College average was $8.03 per student semester hour. Agreement must be made on the student income base. Should all programs use the average income or the income unique to students within their area? The utilization of special fees such as lab or music must also be considered.

State income introduces similar problems. The Florida Community College Division begins the process of funding on differential values for each discipline. However, the inevitable low level of funding and an estimated enrollment base coupled with mid-year cuts due to insufficient state funds make it very difficult to establish a meaningful local deferential funding level. A simple solution is to divide the allocated state funds by the estimated total number of student semester hours to produce an average income per student semester hour. Again, any problems caused by this approach must be understood by the user.

Other income presents no problems of definition. The only problem is the one of determining if such income exists

and to what extent. If such income is provided on other than a regular basis per defined unit, this fact must become a part of the study. Seminole Community College has one program which was a break even program in 1974-75 due to a heavy influx of industry funds. The program is now a loss program due largely to the removal of those industry funds.

Expenses may be approached from two broad viewpoints. A budget or chart of accounts approach will use direct or instructional cost, direct department overhead, cost of equipment and college-wide overhead. The cost accounting approach utilizes depreciation in place of equipment cost.

In most cases the cost-income study is conducted within a very limited time frame. Also, the study should not be more costly than the possible program savings. For these reasons, an expensive and time consuming total audit is neither practical nor even beneficial. If current year data are used in the study, the problem of extending Term I data to the full year still remains. However, great care should be taken with the instructional cost as this is not only the larger part of cost but also the most amenable to change. In the studies at Seminole Community College, the payroll records of instructors are matched with the individual teaching assignment to eliminate any salary which should properly be assigned to a different discipline or to non-instructional activities. Benefits to personnel are considered to be a part of the direct cost of instruction and the retirement and FICA payments made by the College on behalf of an instructor become a part of total instructional cost. Insurance and other benefits have been classified in the Florida Community College Cost Analysis and College-wide expenses and are treated as such in these studies.

The College uses two separate approaches to determine overhead and presents both in the final report. The user has the options of using either approach, or since the elements of cost are clearly displayed, any mix of elements appropriate to needs may be chosen.

A great debate sure to ensue with any discussion of cost centers around "marginal cost." The author has never been able to produce a working definition of marginal cost. Further, he has never been able to find the threshold at which full and marginal cost go their separate ways. He has, however, been informed by various program managers that almost the total offerings of some instructional components are able to operate on marginal cost. All other cost is being absorbed by some

seldom defined other component of instruction.

Cost is displayed in such a way as to allow for recognition of the marginal cost concept. This cost display also provides data using current fund expenditures for Term I. Current fund expenditures are divided into supplies and services, and equipment expenses for the term. A minimal college-wide overhead is also charged. The data used in this configuration will produce a low figure by eliminating departmental administrative and support personnel cost. There is also a certain lack of stability of the data due to the uneven pattern of spending within the supplies and services and equipment budgets throughout the year. If this is known and understood by the user, adjustment can be made if necessary.

The second mode of displaying cost uses the same basic data on instructional cost combined with data from the latest cost analysis. For cost-income conducted during Term II of 1975-76 departmental and college-wide cost data from the 1974-75 cost analysis are used. In the marginal cost method there are no charges for departmental administrative or support personnel. With the cost analysis based cost, both of these costs are included. Unless there has been a drastic reduction in budget amounts for supplies and services, the past data seem to serve well and are more representative of full cost. The college-wide overhead for the past year will probably be low due to the effect of inflation and rapidly raising energy cost. Seminole has been very near the bottom of the scale of community colleges in college-wide overhead per student semester hour and has not had the opportunity to make any appreciable reduction in this spending.

The use of cost data introduces another change that should be noted. Cost analysis uses a five year straight line depreciation rather than equipment cost. If the user requests a substitution of equipment cost for depreciation cost, the cost analysis data are sufficient to allow the interaction.

All cost data included in income and expense items use only the monies of the general current funds of the College. No federal or other non-recurring funds are used. Proposed legislation which would require the College to retain all depreciation of vocational equipment for replacement of that equipment only could require a new look at this component of the cost-income studies. If, indeed, the monies must be held in trust, new income and cost factors will need to be agreed upon.

The study should not confine itself to the essential fiscal

data if other data are uncovered in the analysis. The required examination and checking of the enrollment base will often lead to an investigation of the patterns of course offerings or the composition of the student body of the program. Examination of current expenditures may provide hints to in-depth examination of other accounts and in fact, other cost centers. A chat with the purchasing agent, the accountants, the college print shop personnel, and even the telephone operator are often useful. One good source of information are maintenance and custodial personnel. There is often an unusual drain on these services by some programs that should be considered. There is no check list of personnel to see or sources of data. One must simply be alert to any clue and follow through. A suspicious nature may help but care should be taken not to waste time and effort for very little helpful information. Any extended examination should be undertaken only if there is a strong indication that a real cost or cause will follow.

Enrollment patterns of an unusual nature should be noted. These patterns often indicate prescriptive measures for improved financial health. Such things as too many small sections within a set of multiple offerings of one course or an imbalance of full classes to small classes often appear. Examination of course titles can provide information about shifts in the thrust of the program. Programs may move from being largely a service to the entire college to a strong disciplinary approach. The disciplinary approach may create a low average class size and thus increase the cost while reducing income. In some programs course titles or descriptions indicate further examination of the types of students within the program. In one case, course descriptions led to the discovery that more than half of the student body of one program came from federally supported programs. This data had implications for staffing and long range commitment as the funding was tentative. Any unusual student data would be beneficial to program evaluators.

Whenever a program is only a part of a cost center, it would be worthwhile to examine the possibilities of the program using more than its proportionate share of the resources of that center. Are special support personnel assigned to the program? Would a check of some of the purchases for the cost center be appropriate? What does the purchasing agent say? Are there other programs or cost centers from which the program may draw? These are some of the concerns that need resolution.

Unusual findings become a part of the "notes" of the reports. These findings should be presented as factually and simply as

possible so as not to imply any particular value and thus give bias to the main body of the report. As with the report itself, the "notes" should only serve as information to be imbeded into other information for use in program retention, modification, or dissolution decisions.

Appendix A gives an example of a cost study of a hypothetical program. As is often the case, the study provides as many questions as answers. Using cost approach "A" the program will make its way. However, can it be justified as a marginal program of this degree? A look at equipment cost to date indicates a cure and a question. The cure would hold these expenditures at their present level to overcome some of the loss displayed in option "B". The question is: How low can these expenditures be and what is now encumbered? Other information suggests possible further adjustment. Could fees be raised to improve income? An increase to $12.00 in fees would produce an additional $15,934.05 income. Will the present full-time staffing be a problem if the CETA program is withdrawn? If the student body of the program is changing to "support students", is the general character of the program also changing? Would a detailed study of the instructional cost which includes full-time, part-time, and overload information be helpful? As you can see, the information can be prescriptive, valuable, and madding. The program evaluators must now decide the needs for more information and the sources of that information. The evaluators must also decide the action or inaction which will follow. Program managers will often provide the necessary changes when they have the opportunity to examine and understand the implications of the report.

The relatively large demand for reports and the questionable value of producing some requested reports has led to the development of a formula for quick, if not precise, data. The formula (Appendix B) has the advantage of producing indicators of problem areas without involved detailed examination. Basically, the formula uses the full cost approach of option "B" of the more detailed cost study. The choice and number of variables will allow for as much precision as does the full study. However, the formula has been found to have the greatest use as a broad indicator of program financial health in both a historical and predictive setting.

The formula simply states, in algebraic terms, that the income must be greater than, or at least equal to, the expenses. The formula has the advantage of providing certain guidelines for what would be necessary to make a program self-sufficient. As

with any algebraic formula, the formula may be solved for any variable. However, general usage has shown that the student semester hour and the instructional cost have the greatest practical usage.

Using the data from the previous example (Appendix C, Part I) the formula yields $S \geq 5,919$ and $P \leq 89,166$. In other words, if cost were held constant, production would have to be increased by 545 student semester hours in order to break even. If production is held even, then instructional or other costs would have to be reduced by $9,211.

The formula can be adapted to a variety of usages. Given the estimated salary expenditure for one section, the formula would produce a minimum economical class size. Assuming the income and expense data of the example and a salary of $1,200. the formula yields a minimum of 83 student semester hours (Appendix C, Part II). If the course were a 3 student semester hour course, then 28 students becomes the minimum class size.

The formula usage is limited only by the availability of data and the imagination and needs of the user.

The cost-income study and the program evaluation it supports, can be a time consuming and painful operation. The financial exigencies and the program modifications or eliminations which will follow are not all bad. Education too often operates on momentum alone, carrying with it outdated and questionable programs. There is a need to look at what we do and question it. The resources and energies spent in some programs could be much more productive if placed elsewhere.

As my friend of the introduction might say: "Sometimes we got to do away with some of the things we got, so we can appreciate the things we gotta have".

Appendix A

HYPOTHETICAL PROGRAM

COST - INCOME STUDY

TERM I 1975-76

INCOME:	SSH	5,365	X	9.03 (1)	=	48,445.95
	FTE	178.8	X	842.00	=	150,549.60
						198,995.55

EXPENSES:	A		B	
Instructional	98,376.75		Instructional	98,376.75
600 + 705	26,975.00		Division Overhead	40,237.50
710	5,125.00		College Overhead	69,637.70
College-wide	53,650.00			
	184,126.75			208,251.95

A	B
Based on proportional part of supplies and services (600+705) and equipment (710) Cost for 1975-76. $10 used as College-wide Overhead. No Departmental Administrative or Support Cost.	Based on 1974-75 cost analysis cost on non-federal funds. Program overhead $7.50/SSH. College-wide $12.98/SSH.

NOTE: (1) Term I 1975-76 average income/SSH

(2) 2,310 SSH created by 35 sections of CETA classes with average class size of 22. Average class size for remaining sections is 18.

COST - INCOME FORMULA

Variable Listing

S = Student semester hours (ssh)

F = Student fee per ssh

R = State funding per ssh

D = Division Overhead cost per ssh

C = College-wide overhead cost per ssh

P = Instructional personnel cost in dollars (Include Retirement and FICA)

Optional Variables

W = Fee waiver cost in dollars (Use when waivers are responsibility of program)

I = Special income in dollars (Lab or other special fees charged for program)

E = Special expenses in dollars (Not covered in C)

Formula with two alternate solutions.

INCOME EXPENSES

$$\left[(F \cdot S) + (R \cdot S) + I\right] - \left[(D \cdot S) + (C \cdot S) + P + E + W\right] \geq 0$$

$$F \cdot S + R \cdot S - D \cdot S - C \cdot S - P + \overbrace{I - E - W}^{\text{optional}} \geq 0$$

$$(F + R - D - C)\, S - P + I - E - W \geq 0$$

Let $X = F + R - D - C$ ssh factor

Solve for S

$$S \geq \frac{P - I + E + W}{X}$$ or without options $$S \geq \frac{P}{X}$$

Solve for P

$$P \leq X \cdot S + I - E - W$$ or without options $$P \leq X \cdot S$$

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HYPOTHETICAL PROGRAM

FORMULA

COST - INCOME

STUDY

PART I

S = 5,365

F = 9.03

R = 842.00 ÷ 30 = 28.07

D = 7.50

C = 12.98

I = 98,376.75

X = 9.03 + 28.07 - 7.50 - 12.98. = 16.62

$S \geq \frac{P}{X} = \frac{98,376.75}{16.62} = 5919$

$P \leq X \cdot S = (16.62)\ 5,365 = 89,166$

CLASS SIZE STUDY

PART II

Salary 1,200

Benefits 15%

Total Salary 1,380

$S \geq \frac{1,380}{16.62} = 83$ ssh

83 ÷ 3 = 28 students

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